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INSTITUTE OF GAS TECHNOLOGY

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GAS ABSTRACTS

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1. GAS INDUSTRY

Canadian Gas

Dack, W. L. TRANS-CANADA GAS LINE CONSTRUCTION DELAYED UNTIL 1956. *World Petroleum*, 26, 68-70 (1955) May.

The factors causing the construction delay on the Trans-Canada's proposed 2,350 mile Alberta to Montreal pipeline are described. Estimates of gas sales for the pipeline are also presented.
G. G. Wilson

Tyrell, D. WESTCOAST TRANSMISSION PLANS DELIVERIES TO U. S. IN 1956. *World Petroleum*, 26, 66-7 (1955) May.

A summary of the history of Westcoast Transmission and of their plans for the construction of pipeline facilities to transport natural gas from the Peace River area of Alberta and British Columbia to markets in Western Canada and Northwestern United States.
G. G. Wilson

Gas-Electric Comparison

Segeler, C. G., Kafka, E. M. COMPARATIVE TOTAL COSTS OF GAS AND ELECTRICITY FOR COOKING AND WATER HEATING IN RESIDENCES. Report, Amer. Gas Assoc., Committee on Comparison of Competitive Services, 26 pp. (1955).

This study represents the careful analysis of data from a wide section of the industry and shows that in addition to many performance superiorities gas equipment generally costs less to purchase, install and operate for cooking and water heating purposes. This will be of particular interest to all in sales field.
R. T. Ellington

Harris Bill

Duff, D. M. GAS GIRDS TO FEND OFF FEDERAL CONTROL. *Oil Gas J.*, 54, 140-47 (1955) May 16.

The viewpoint of natural gas producers in regard to federal regulation of producers is presented. Escalation clauses are discussed and statistical information is presented in graphical and tabular form to emphasize their contention that regulation of natural gas producers and gatherers is unnecessary and undesirable.
G. G. Wilson

Linz, B. F. GAS PRICES NEAR PEAK. *Oil Gas J.*, 54, 76-77 (1955) June 6.

A report of recent activity in the Senate and House of Representatives concerned with gas legislation. Mr. Kuykendall's remarks before the Senate interstate commerce committee are cited, as well as some of the views of consumer and producers.
R. F. Bukacek

Robinson, J F. WHY THE HARRIS BILL SHOULD BE AMENDED. *Gas Age*, 115, 27-31 62, 64, 65 (1955) May 5.

A report of the testimony of the president of the Consolidated Natural Gas Company before the House Committee on Interstate and Foreign Commerce setting forth his company's views on the Harris Bill and pointing out the impact of the unrestrained operation of favored-nation and escalation clauses to the operation of gas utilities.
R. F. Bukacek

Springborn, H. W. WILL NATURAL GAS ACT BE PASSED? *Gas Age*, 115, 32-3 (1955) May 5.

A digest of support for the Harris Natural Gas Bill is presented including the highlights of a report of the F.P.C. to the House Interstate and Foreign Commerce Committee. The members of the Senate and House Interstate and Foreign Commerce Committees are listed in 1955 and for the period 1955-59.
G. G. Wilson

ESCALATION: A UTILITY ABSCESS? *Gas Age*, 115, 17, 18, 61, 62 (1955) May 19.

A summary of the views expressed on behalf of Consolidated Edison Co. of New York before the House Interstate Commerce Committee concerning escalation clauses, their effects and remedies.
R. F. Bukacek

Industry Regulation

Smith, L. SHOULD PUBLIC UTILITY COMMISSIONERS BE ELECTED OR APPOINTED? PART II. *Public Utilities Fortn.*, 55, 542-52 (1955) May 12.

The common problems and differences between the two systems of recruiting commissioners are considered in general and then in relation to certain case studies of commissions in several states. In conclusion, the opinion is ex-

pressed that the appointing system generally results in more able commissioners than the elective system. (See *Gas Abs.* 11, 117, July)

G. G. Wilson

Management Aid

Symonds, G. H. HOW TO USE LINEAR PROGRAMMING. *Petroleum Proc.*, 10, 674-80 (1955) May.

Linear programming is the title of one of the new methods of making executive decisions, based on quantitative information and analysis: it is a mathematical tool of the new science of "operations research". With the high-speed, large-capacity computers that are available there is no limitation to the number of variables which can be handled. Two illustrative problems are given: the first, on fuel blending, to show the rudiments of the mathematical procedure; and the second, on a refinery running plan, includes complete calculations.

B. E. Eakin

Public Information

Collins, J. H. NATURAL GAS STILL NEEDS EXPLAINING. *Public Utilities Fortn.*, 55, 535-41 (1955) May 12.

A review of the recent advertising campaign by Southern California Gas Companies to inform the general public about the gathering and distribution of natural gas.

W. G. Bair

Southern Activity

Adams, E. NATURAL GAS RISES WITH THE SOUTH. *Amer. Gas J.*, 182, 19-23 (1955) May.

Brief summaries of the 1954 annual reports of 17 natural gas companies operating in the South are presented. All but two reported higher net incomes than in 1953. G. G. Wilson

2. APPLIANCES

Air Conditioning

Cooper, W. B. LIQUID HEATING AND COOLING FOR YEAR-ROUND AIR CONDITIONING. Air Cond., *Heating Ventilating*, 52, 89-95 (1955) June.

Remote-type room units provide industrial room control for year-round air conditioning systems. Information is presented regarding the common types of systems and how to determine water flow rate, water temperature and other design factors. Basic points are given for good design and installation practice.

Author's Abstract

Cookers

THE NEW OPERATING FEATURES OF DOMESTIC ELECTRIC RANGES. *Gas*, 31, 63-68 (1955) June.

The high-speed heat up switch, and the infinite heat switch are described. Increased efficiency of electric top cooking, thermostatically-controlled surface cooking and the quick pre-heat oven are described. R. T. Ellington

Degree-Day Forecast

ANTICIPATING DEGREE-DAYS. *Fueloil and Oil Heat*, 14, 60-61 (1955) June.

A short discussion is presented of the Brosché method of anticipating degree days six months in advance. Comparisons are made of the actual and forecast numbers of degree days over several year periods. R. T. Ellington

Gas Motor Air Conditioner

HOW IT WORKS: THE COLEMAN GAS MOTOR AIR CONDITIONER A BIG STEP IN GAS INDUSTRY RESEARCH. *Amer. Gas J.*, 182, 18, 19 (1955) June.

A follow-up article on Coleman Company activities in gas air conditioning describes the gas motor unit. Components servicing and some operating costs are given. J. F. Reed

GAS-MOTOR AIR CONDITIONING ARRIVES. *Gas Age*, 115, 32, 33, 36, 68 (1955) June 16.

A report is given of an address by Sheldon Coleman to the Southern Gas Association, May 16 on the Coleman gas engine-driven air conditioner. The unit is described with respect to components and operating features. Operating costs are expected to be significantly lower than for electric units. Marketing is expected in 1956 after scheduled field tests. J. F. Reed

Heat Pump

Sinclair, W. D. HOW MUCH DOES A HEAT PUMP SYSTEM COST? *Heating, Piping, Air Cond.*, 27, 91 (1955) June.

A brief discussion is given of installation and operating costs of an electrically operated heat pump of 90 tons in a Georgia courthouse and a 150 ton unit in a Georgia hospital.

J. F. Reed

House Heating

THE IMPACT OF OIL AND ELECTRICITY ON THE GAS HOUSEHEATING LOAD. *Gas*, 31, 62-63 (1955) June.

Recent improvements in oil burner installations are cited. Rough comparisons of installation and operating costs are made for gas and electric space heating. R. T. Ellington

Water Heating

Wood, K. HOW GREAT IS THE THREAT OF THE NEW "HIGH SPEED" ELECTRIC WATER HEATER? *Gas*, 31, 50-52 (1955) June.

The new 40-gal. electric heater utilizes two 4.5 Kw heating elements, one of which is located in the upper 10-gal section. This heater is used for quicker recovery of the upper 10-gal after the heater has been emptied. The current 40-gal gas unit with 53,000 Btu input is 2½ times as fast as this unit, and the 40 gal unit with 33,000 Btu input is 1.6 times as fast. Many electric utilities still limit demand to 3 Kw; this will limit the distribution of this higher input heater which still cannot meet the continuing demand of the modern washer. R. T. Ellington

SALES OF WATER HEATERS. *Gas Age*, 115, 39, 66 (1955) May 5.

Potential sales of water heaters as forecast by the AGA Bureau of Statistics are presented in tabular form and discussed. These estimates are classified according to the four major components of the potential market (New Housing, Replacement of Older Gas Equipment, Replacement of Competitive Equipment, Older Housing) and among four major geographical areas and incinerators are also briefly presented.

G. G. Wilson

3. COMBUSTION AND INDUSTRIAL FURNACES

Flame Turbulence

Bolz, R. E. and Burlage, H., Jr. THE INFLUENCE OF TURBULENCE ON FLAME PROPAGATION RATES. *Jet Propulsion*, 25, 265-75 (1955) June.

An experimental method is described for the study of turbulence and flame propagation using flames in a flaming gas stream. The combustible mixture is ignited by a spark and the expanding flame front photographically recorded. On the assumption of a spherical flame front, the burning velocity is calculated from the radius of the flame globule. The laminar and turbulent burning velocities of Cleveland natural gas were determined and the results compare favorably with those obtained by other investigators.

S. A. Weil

Olsen, H. L. and Gayhart, E. L. INCIPIENT FLAME PROPAGATION IN A TURBULENT STREAM. *Jet Propulsion*, 25, 276-83 (1955) June.

The experimental procedure used was similar to that described in the previous article. It was found that under conditions of isotropic turbulence, the rate of flame propagation within the first 2 milliseconds is the same as under laminar conditions. Non-isotropic turbulence enhances the rate of propagation to an extent dependent on stream velocity and intensity of turbulence. Evidence is given that in some cases, turbulence may quench the combustion process, but it is not clear as to the conditions necessary for this effect. S. A. Weil

Flame Weeding

Brown, D. SOUTH SEES INCREASED USAGE OF L.P. GAS FOR COTTON CULTIVATION. *Butane-Propane News*, 17, 56, 58, 60 (1955) June.

Liquefied petroleum gas, used to fire the flame cultivator, is becoming increasingly important in the South as a weapon in overcoming the weed problem and as a booster to mechanization.

Author's Abstract

Industrial Heating

Hess, F. O. (assigned to Selas Corp. of Ameri-

ca) HEAT TREATING APPARATUS. U.S. 2,711,309 (1955) June 21.

The invention relates to heat treating machines for automatically heating a predetermined length of the end of a bar. J. G. Chalcraft

MODERN PORCELAIN ENAMELING SYSTEM FOR STOVE PARTS UTILIZES GAS FURNACES AND OVENS. *Ind. Heating*, 22, 799, 800, 802, 804, 806, 808-09 (1955) April.

An article describing the porcelain enameling department in a plant that operates to the highest standards to give range parts a porcelain finish in continuous quantity operation. J. G. Chalcraft

Tobacco Curing

L. P. GAS IS THE BEST FUEL FOR CURING TOBACCO. *Butane-Propane News*, 17, 65 (1955) June.

An article describing LP-gas as the most economical and advantageous fuel for curing tobacco. J. G. Chalcraft

Turbine Automobile

GAS TURBINE MAKES ITS STATION DEBUT. *Nat. Petroleum News*, 47, 53 (1955) June.

Chrysler's experimental gas turbine-powered Plymouth has been touring Detroit the past few months. Powerful acceleration was displayed, as well as some noisiness in this public preview. E. B. Shultz

4. CARBONIZATION AND GASIFICATION

Coal-Chemical Processes

Nedelman, H. TECHNIK UND WIRTSCHAFT DER KOHLENCHEMIE (TECHNOLOGY AND ECONOMICS OF COAL CHEMISTRY). *Erdoel und Kohle* (German, 8, 382-87 (1955) June.

Detailed descriptions of coking, low temperature carbonization, gasification and hydrogenation processes that are currently in practice in Germany are given. The refined products, obtained by the processing of coal tar and benzene are used as raw materials for the production of dyestuffs, pharmaceutical products and plastics. Since the gas requirements of the German Industry are increasing at a faster rate than the quantity of gas obtained by coking, the production of consumer gas by complete gasification of bituminous coal according to the Lurgi process has been started in recent years. The processes of hydrocarbon synthesis according to Fischer-Tropsch and Bergius have lost their importance owing to the increase in prices of coal and coke. K. C. Channabasappa

Coal Research

Hinshelwood, C. N. and Parker, A. REPORT OF THE FUEL RESEARCH BOARD FOR THE YEAR 1954. Dept. Scientific and Ind. Research, 70 pp., 3s. Od., HMSO, London (1955) January.

Many phases of the research program of the Fuel Research Station are described. These include summaries on constitution of coal, carbonization, gasification, oil and chemical synthesis, petroleum fuel oils, boiler investigations, coal-fired turbines, domestic heating, and air pollution. Liaison and committee activities, and staff publications are listed. O. P. Brysch

Whitaker, A. THE ULTIMATE STRUCTURE OF COAL. *J. Inst. Fuel* (British) 28, 218-23, 257 (1955) May.

A brief survey of the knowledge of coal structure up to the present day and the recently developed techniques such as X-ray analysis, infra-red absorption spectra and magnetic resonance used in the investigation of coal constiution are outlined. The carbon skeleton of vitrain has been known to be built up of stable, chemically inert net-like units which grow slowly with increasing rank. The edges of inert units are fringed with fairly simple chemical groupings, containing two or three atoms of carbon, oxygen is present both as hydroxyls and as aromatic ether linkages. K. C. Channabasappa

Electrical Carbonization

Borch, N. S. (assigned to F. L. Smidth & Co.) METHOD AND APPARATUS FOR EXPELLING VOLATILE CONSTITUENTS FROM SOLID CARBONACEOUS FUEL. U. S. 2,710,280 (1955) June 7.

This patent describes a method for expelling volatile constituents from solid carbonaceous

fuels by the use of an electric current as a heating medium. The apparatus for the practice of this method comprises a movable vessel for holding a charge of material and is provided with electrodes between which current may flow through the material. The charge of material is heated uniformly and insufficient heating or overheating of portions of the material are prevented. K. C. Channabasappa

Germanium in Coal Ash

Howes, E. A. THE OCCURRENCE AND RECOVERY OF GERMANIUM IN LARGE WATER-TUBE BOILERS. *J. Inst. Fuel* (British), 28, 298-99 (1955) June.

Demand for germanium is such that refiners are accepting raw material for processing which contain 0.1 per cent Ge. Studies of dust deposits from various types of water-tube boilers showed low concentrations (below 0.1%) of Ge in coarse dusts (above 10 microns) because of large dilution, but high concentrations (up to 0.85%) in the dusts of 1 micron size, especially with travelling grate and retort type boilers. Hartley Main and certain Northumberland and East Midlands coals appear to be high in germanium, and pilot plant dust recovery is proceeding. O. P. Brysch

High Coke Ovens

von Massow, H. J. and von Holt, H. DEVELOPMENTS AND FEATURES OF HIGHER COKE OVEN CHAMBERS. *Gas World* (British), 141, (Coking Sect.) 121-26, 128 (1955) June 4.

The trend of centralization, with retirement of small local coke oven plants and concentration into large, high capacity units, has presented the problem of efficient space utilization. The high chamber coke oven, with chambers up to 6 meters (19 ft 8 in) high, is offered by Carl Still for limited plant sites. Features of oven structure, heating wall and door sealing design, and labor savings due to high throughput per man are discussed, and operation costs for ovens of different heights are estimated.
O. P. Brysch

H_2S Removal

Davies, R. G. and Hartmann, H. F. THE USE OF PYRITES CINDERS IN TOWN'S GAS PURIFICATION. *Nat. Gas Bull.* (Australia), 19, 8-15 (1955) March-April.

Cinders from roasting of pyrites were found to have much higher capacity for absorption of H_2S than the oxide normally used. The cinders alone were physically unsuitable for use as purifying material, but were satisfactory when used in admixture with natural oxide. Results of pilot plant and works scale experience are reported. D. M. Mason

Oil Gas

Dirksen, H. A., Linden, H. R. and Pettyjohn, E. S. AUTOHYDROGENATION OF OIL GASES. Institute of Gas Technology Research Bulletin No. 25 (1955) March ($5.00).

This Bulletin presents the results of a study of the improvement of the substitutability of high-Btu oil gases for natural gases by catalytic autohydrogenation of their olefinic constituents. Simulated and actual high-Btu oil gases, with and without purification, were autohydrogenated by use of selected hydrogenation catalysts in three laboratory fixed-bed reactors, a laboratory fluid-bed reactor, and a pilot plant fixed-bed reactor.

The effects of reaction temperatures from 200° to 500°F, and of space velocities from 200 to 1000 SCF/CF catalyst-hr, were fully defined for impregnated nickel-kieselguhr catalysts with nickel concentrations of 2, 5 and 10 weight percent. In addition, twelve selected iron, cobalt, molybdenum and platinum catalysts were studied over a more limited range of operating conditions. The influence of the hydrogen/olefin ratio of the feed gas, and of small amounts of air, carbon monoxide, thiophene, mercaptans and butadiene, on the activity of a 5 weight percent nickel-kieselguhr catalyst, was also investigated.

It was found that fixed- and fluid-bed 5 weight percent nickel-kieselguhr catalysts could be fully regenerated, after repeated sulfur poisoning, by burnoff with air and oxygen. Low purity process hydrogen was shown to be suitable for catalyst activation. The activation step, consisting of exposure of the catalyst to hydrogen at 700°-850°F for periods of up to three hours, was shown to be essential in the use of nickel catalysts for the auto-hydrogenation reaction.
H. R. Linden

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Compression Theory

Emmons, H. W., Pearson, C. E., and Grant, H. P. COMPRESSOR SURGE AND STALL PROPAGATION. *Amer. Soc. Mech. Eng. Trans.*, 77, 455-69 (1955) May.

A report of investigations on compressor surge showing two distinct types of phenomena. Theoretical discussions of stall propagation and surge are presented. R. F. Bukacek

Prausnitz, J. M. ISENTROPIC COMPRESSION OF NONIDEAL GASES. *Ind. Eng. Chem.*, 47, 1032-33 (1955) May.

This paper presents a perfectly general analytical treatment of isentropic compression of non-ideal gases, utilizing P-V-T data in the form of the Beattie-Bridgeman equation of state. An illustration of the method follows its derivation. B. E. Eakin

Condensate Recovery

Campbell, J. M. HOW TEMPERATURE AFFECTS SEPARATION. PART III—ELEMENTS OF FIELD PROCESSING. *Oil Gas J.*, 54, 117-19 (1955) May 9.

The effect of temperature on the recovery of liquid hydrocarbons from field separators is discussed. Various methods of controlling temperature are presented, and a series of "rules of thumb" that apply to most separator problems are given. B. E. Eakin

Campbell, J. M. HOW WELL-STREAM COMPOSITION AFFECTS DEGREE OF SEPARATION. PART IV. ELEMENTS OF FIELD PROCESSING. *Oil Gas J.*, 54, 84-6 (1955) May 30.

The fourth in a series, this article delineates a number of the more significant variables which determine the quantity of stock tank fluid in the separator. R. F. Bukacek

Jamison, L. R. THE APPLICATION OF LOW TEMPERATURE SEPARATORS TO HIGH PRESSURE GAS CONDENSATE PRODUCTION. *Calif. Oil World*, 48, 1, 2, 5, 7, 12 (1955) May 15.

The mechanism of low temperature separation and the results obtained by use of these units are discussed. With the price of high-gravity condensate fluids being $3.00 to $3.50 per barrel, producers are spending more time investigating the various methods of separation presently available. Increased recoveries of 15 to 30% are frequently obtained, and the dew-point depression obtained in some cases diminishes the need for any further dehydration of the sales gas. B. E. Eakin

Distribution Safety

Behr, P. G. PROTECTING DISTRIBUTION STRUCTURES. *Gas Age*, 115, 19-21, 60-1 (1955) May 19.

The manner in which the Portland (Ore.) Gas and Coke Co. used an inspection program, a system for classification of accidents, a study of frequency rates and increased cooperation with city officials and outside contractors to reduce accidental damage to underground gas piping is described. G. G. Wilson

Drilling

Burnhart, V. N. LOWER DIAMOND DRILLING COSTS WITH WIRE-LINE CORE BARREL. *Mining Eng.*, 7, 548-50 (1955) June.

The use of a core barrel which can be run in and retrieved, when filled or blocked, by use of wire line techniques can materielly reduce drilling time in BX holes. The Longyear Co. has released a wire-line core barrel for such work. The core barrel can be dropped free into position in water filled wells, or circulated into place, or run in on the wire line. Approximately 75,000 feet of hole had been cored using this equipment as of December, 1954, with an average measured core recovery of 94.01%. B. E. Eakin

Walker, R. L. WHAT'S AHEAD IN RIG DESIGN? PART I. *Oil Gas J.*, 54, 102-06 (1955) May 23.

This article discusses three basic rig designs, selected according to depths for drilling, that feature flexibility, balance, and portability. The

first is a portable rig in the 3000 to 6000 ft class, the second, a portable rig, 6000 to 12,000 ft class, and the third a unitized heavy-duty drilling rig, for from 12,000 to 20,000 feet. Many excellent ideas obtained from field experience are presented. B. E. Eakin

Exploration

Enright, R. J. TEXANS BEGIN OIL SEARCH IN HONDURAS. *Oil Gas J.*, **54**, 96, 100 (1955) May 9.

A group of Texas oil men have negotiated a 20-year mineral concession on the North Shore of Honduras. The area covers some 48 million acres including the coastal bays and islands. The concession covers exploration for and exploitation of oil, gas, coal, iron, sulfur, and manganese. The group is also interested in Nicaragua. B. E. Eakin

Kelly, F. W., Jr. PETROLEUM EXPLORATION WITH RADIO WAVES. *Petroleum Eng.*, **27**, B40, 42, 44-54, 56-7 (1955) June.

The use of radio waves in prospecting for geological structure is reviewed. This method, although in the experimental stage of development, has several distinct advantages. Continuous records can be made without stopping, resulting in high-speed low cost operation. This method is particularly applicable to determining the location of faults. Also, studies of the use of radio waves in the direct determination of the presence of petroleum are outlined. The prospects look promising, but much further field study is necessary before the limitations and possibilities can be fully evaluated.

B. E. Eakin

Levorsen, A. I. POSSIBLE FUTURE PETROLEUM PROVINCES. *Indep. Petrol. Assoc. of Amer. Monthly*, **25**, 34, 36, 78-83 (1955) April.

The need to maintain the incentive to explore, and the locations of a few possible future petroleum provinces with maps are discussed. Facts about the Cambrian formations and the possibilities that lie there are summarized. Unusual types of reservoir rock, more complete knowledge of fluid phenomena, and more complete recovery are three of the many subjects that are being studied and that may ultimately develop substantial new oil and gas production.

J. R. Hasenberg

Russell, J. H. INTERPRETATION PROBLEMS IN RADIOACTIVITY LOGGING. *Petroleum Eng.*, **27**, B72, 74-76 (1955) June.

Since the introduction of the gamma and neutron logging techniques many cases have been observed where the field behavior has not coincided with existing theory. The interpretation problems mentioned in this paper give but a few of the many instances where a much more concentrated study is needed to make use of all of the information radioactivity logs are capable of furnishing. B. E. Eakin

Fracturing

Brooks, T. P., O'Quinn, P. C., Life, W. E. FRACTURING AT HIGH INJECTION RATES, SPRABERRY TREND AREA FIELD. *J. Petroleum Tech.*, **7**, 14-17 (1955) May.

The application of relatively large volume fracture treatments using an oil-sand mixture at high injection rates in wells completed in the Spraberry formation has indicated improved drainage from the matrix rock. This is considered to result from enlargement of existing open fractures, possibly from opening of fractures not previously effective, and breaking down existing blockage in the vicinity of the wellbore. The results of this type of treatment as applied to a group of wells in the Spraberry Trend Area field are discussed with reference to well performance and economics.

Authors' Abstract

Hurst, R. E., Moore, J. M., and Ramsey, D. E. "FRAC" TREATMENT MODERN WELL STIMULATION METHOD. *Indep. Petrol. Assoc. of Amer. Monthly*, **26**, 30, 58-63 (1955) May.

Application techniques are described for the treatment of reservoirs by injection of a sand-carrying agent for the purposes of increasing production. A broad classification of these carrying agents is made as follows: 1) Hydrocarbon gels; 2) Aqueous gels, a. Acid, b. Water; 3) Emulsions; 4) Refined oil, and 5) Lease oil. The properties of the sand to be used are also discussed. J. R. Hasenberg

Hurst, R. E., Moore, J. M., and Rollins, J. T. HYDRAULIC FRACTURING IN THE PER-

MIAN BASIN. *World Oil*, 140, 243-46, 248, 250-52 (1955) June.

Approximately 98% of the fracturing treatments in the Permian Basin have been conducted in 8 of the 19 productive pays found in the area. These zones are discussed in some detail. The growth of the fracture treatment is outlined, and the trend of this method of production stimulation is discussed.

B. E. Eakin

Sallee, W. L. and Gionta, A. TAILOR-MADE FRACTURING PAYS OFF IN THE ROCKIES. *Petroleum Eng.*, 27, B120-23 (1955) June.

The results of some fracturing jobs in the Rocky Mountain area are described. Best results are indicated when the treatment is based on a study of the individual well conditions. Various decline curves are given for typical formation.

B. E. Eakin

Jet Compressors

Dotterweich, F. H. and Mooney, C. V. DESIGNING AND OPERATING GAS JET COMPRESSORS. *Pipe Line Ind.*, 2, 32-37 (1955) April.

Charts are presented from which the applicability of jet compressors to a given compression may be determined. The charts are in the high pressure range from 1000 to 3000 psi motive gas pressure.

R. F. Bukacek

Leakage Surveys

Eynon, S. B. INSURANCE AGAINST GAS BLASTS. *Amer. Gas J.*, 182, 27-9 (1955) May.

Leakage surveys are classified into four basic types: 1) Vegetation- and coal survey. 2) W-type survey; 3) LP-gas survey; 4) Combined utility survey. The information obtained by each of these types of survey and the procedure used to conduct them is described.

G. G. Wilson

LP-Gas Prices

Casper, J. C. and Reilly, J. BETTER TIMES AHEAD FOR L.P.G.? *Oil Gas J.*, 54, 78-80 (1955) May 23.

The effect of underground storage of LP-gas on the market price during winter 1954-55 was to maintain a lower price than usually commanded by the product during the cold season. This spring, some operators caught with excess supply, dumped their excess on the market, causing a collapse of the price structure, and a low of 2 cents per gallon in tank cars. The price has since risen slightly, and the outlook for next winter is decidedly better.

B. E. Eakin

Natural Gasoline

Taylor, J. B. HOW WEATHER AFFECTS DESIGN OF A NATURAL-GASOLINE PLANT. *Oil Gas J.*, 54, 76-8 (1955) May 30.

The influence of weather and water availability as these affected the design of the Tioga N. D. plant of the Signal Oil Company is discussed.

R. F. Bukacek

Pakistan Pipe Line

SUI LINKED TO KARACHI. *Oil Gas J.*, 54, 105 (1955) May 9.

The main construction job has been completed on the 348 mile West Pakistan line from Sui to Karachi. This is the first big natural-gas pipeline in the Far East. Its present throughput will be about 45 MMCF daily. This will supply approximately 42% of Pakistan's present energy requirements.

B. E. Eakin

Perforation

Cocanower, R. D. BETTER RESULTS FROM SHAPED CHARGES. *Oil Gas J.*, 54, 74-75 (1955) May 30.

The trend toward completing oil wells by perforation has resulted in the development of a new shaped-charge tool capable of forming a larger hole with deeper penetration, and at a density of 6 shots per foot with one run. Results of tests on other recently developed guns and charges are included.

B. E. Eakin

Productivity Study

Gladfelter, R. E., Tracy, G. W., and Wilsey, L. E. SELECTING WELLS WHICH WILL RESPOND TO PRODUCTION-STIMULATION TREATMENTS. *Oil Gas J.*, 54, 126-27, 129-31 (1955) May 23.

A new analytical method is presented for analyzing producing rate and pressure-buildup data, which permits direct measurement of the

cause of low well productivity. The theory and mathematical development of the technique is presented, and examples of actual well problems are included. B. E. Eakin

Reservoir Behavior

Bass, D. M. and Crawford, P. PREDICTING RESERVOIR PERFORMANCE. *Petroleum Eng.*, 27, B59-60, 62, 64, 68, 70 (1955) June.

Three procedures of numerical integration for estimation the action of solution gas drive on future oil production are presented. Detailed calculation procedures for each are given, with illustrative examples, and a comparison of the solutions obtained by successive approximations, by the Runge-Kutta method, and by the Milne method are tabulated.

B. E. Eakin

Caudie, B. H., Erickson, R. A. and Slobod, R. L. THE ENCROACHMENT OF INJECTED FLUIDS BEYOND THE NORMAL WELL PATTERN. T. P. 4041. *J. Petroleum Tech.*, 7, 79T-85T (1955) May.

The X-ray shadowgraph technique was used to study the edge effect of injected fluid encroachment for a five-spot injection pattern. It was found that surprisingly large portions of the reservoir area lying outside the well network are contacted by the injected fluid before abandonment conditions are reached. From the results given, it is possible to estimate the extent of encroachment and the injection volume necessary to produce the wells to abandonment conditions. B. E. Eakin

Cornell, D. CALCULATION OF STABILIZED GAS WELL PERFORMANCE CURVES FROM BACK PRESSURE TEST DATA. TECHN. NOTE 279. *J. Petroleum Techn.*, 7, 53-55 (1955) May.

Back-pressure test data on gas wells are essentially unsteady-state measurements. The procedure for calculating three day, seven day, and other duration stabilized performance curves from back-pressure test data has been developed and the use of the method is illustrated with a typical problem. Stabilized performance curves are useful in calculating gas well deliverabilities and in scheduling production from gas fields.

B. E. Eakin

McDowell, J. M. PERFORMANCE OF WATER DRIVE RESERVOIRS, INCLUDING PRESSURE MAINTENANCE, AS DETERMINED BY THE RESERVOIR ANALYZER. T. P. 4042. *J. Petroleum Techn.*, 7, 73T-78T (1955) May.

A study has been made to determine how the behavior of a water drive reservoir changes as a function of the permeability of the formation and as a function of the size of the aquifer. The effect of pressure maintenance programs on the rate of natural water influx is also studied, as well as the influence on the influx of the position of injection wells with reference to the oil-water contact. The results are determined by the use of an electrical reservoir analyzer and are plotted as families of curves of pressure, natural water influx, and water injection vs. time or cumulative production. Two size aquifiers are studied. One is limited with a 36-mile radius, and the other approximates an infinite reservoir. The field remains the same in all respects for the complete study except that the permeability is changed to agree with that assumed for the aquifer.

Author's Abstract

Olansen, N. A. SECONDARY RECOVERY OPERATIONS IN THE TIJERINA NO. 3 UNIT RESERVOIR. *J. Petroleum Techn.*, 7, 23-26 (1955) May.

This paper presents the production history of the Tijerina No. 3 reservoir (Premont, Texas) from its initial development in April 1945, through April, 1954, including primary development, unitization, and secondary recovery by high pressure gas injection. Particular attention is given to reservoir performance as influenced by the migration of fluids in a continuous but erratic sand of low permeability.

B. E. Eakin

Storage

Mackie, D. M. THE FIELD THAT LEARNED TO BREATHE. *Gas Age*, 115, 23-26, 67, 68 (1955) May 5.

A description of the underground gas storage project developed by the Southern Indiana Gas and Electric Company. R. F. Bukacek

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Bolivian Pipeline

BOLIVIAN INDUSTRY GROWS. *Oil Gas J.*, 54, 136 (1955) May 16.

Plans for the expansion of crude oil pipeline facilities in Bolivia are described. A novel feature of a proposed line dropping 15,000 ft in 48 miles is a provision for using the crude oil pressure to drive a turbine to generate electricity. G. G. Wilson

Desulfurization

Porter, F. W. (assigned to British Petroleum Co., Ltd.) CATALYTIC DESULPHURISATION OF PETROLEUM HYDROCARBONS. U. S. 2,706,703 (1955) April 19.

In the autofining process for removal of sulfur from petroleum fractions it has been found that low activity of the cobalt-molybdenum catalyst at the commencement of the run can be largely overcome by subjecting the catalyst to the action of hydrogen sulfide or hydrogen-sulfide-containing gas prior to its use in the process. D. M. Mason

Fluidized Coking

Krebs, R. W. (assigned to Esso Research and Eng. Co.) PRODUCTION OF COKE AGGLOMERATES. U. S. 2,709,676 (1955) May 31.

A pelletized petroleum coke of marketable size is produced from liquid hydrocarbon residues by a two-stage fluidized process. First, the residues are sprayed into a fluid bed of 30 to 400 mesh particles held at temperatures of 950° to 1100° F. to form lighter distillate oils and carbon which deposits in layers on the particles. Then a portion of these particles are passed to a second fluid bed, where at 800° to 900° F. additional oil residues are injected at a rate to cause pasty agglomeration into pellets, finally too large to be fluidized. The pellets, sinking to the base of the agglomerator can be removed by gravity through a seal. O. P. Brysch

Oil Demand

U. S. EXPANSION SPELLS GOOD TIMES AHEAD FOR OIL MARKETERS. *Nat. Petroleum News*, 47, 46-49 (1955) June.

Economists predict 1955 domestic demand for oil products to be up 4 to 5% for gasoline, up 7% for distillates, with an average rise for all products of 4.5%. According to one expert, distillate demand will be higher due to increased sales of oil heating systems to new homes. Another source reports that last winters heating oil was an all-time peak, 11% ahead of the previous season, and predicts the trend to continue. E. B. Shultz

Oil Production

Coleman, J. P. OUR CAPACITY TO PRODUCE OIL IN THIS COUNTRY. Indep. Petrol. Assoc. of Amer. Monthly, 26, 26, 28 (1955) May.

This outlines the IPA of A Productive Capacity Committee's second report on oil producing capacity in the United States. A previous report was made in May 1954. Tables for petroleum productive capacity as of Jan. 1951 to Jan. 1955, by geographical districts, and a forecast of capacity as of Jan. 1955 to Jan. 1956 are given. J. R. Hasenberg

Recent Fields

Conselman, F. B. THE JAMESON-STRAWN SAND TREND. *World Oil*, 140, 134, 136, 138-39, 142, 144, 153-54, 166 (1955) June.

During the period of less than 3½ years since active development of the Strawn trend began, over 400 producers have been completed in an area 18 miles long by 5 miles wide. Maps showing the present wells are included, and the topography and geology of the area are discussed. The production appears to be similar in many respects to the Spraberry Trend. B. E. Eakin

Simmons, J. R. THE VIREY-ELLENBURGER TREND. *World Oil*, 140, 115-16, 118, 120, 122, 124, 126, 130 (1955) June.

In December, 1953, the Reynolds Mining Corporation's Roy Parks 1 was completed as a Pennsylvanian limestone discovery. This marked the beginning of the Virey Pennsylvanian and Ellenburger trend drilling. Wells with potentials as high as 3200 bbls of 49°-gravity crude daily, have been brought in. The productive formations are encountered at

depths of 11,300 and 13,200 feet. The drilling and completion practices used in this trend are discussed, and typical logs of the pay zones are reproduced. B. E. Eakin

Thiophene Removal

Johnson, C. A., and Schuman, S. C. (assigned to Hydrocarbon Research Inc.) GASOLINE TREATMENT. U. S. 2,707,698 (1955) May 3.

A principal object of this invention is to provide a process for treating raw gasoline fractions containing at least 20% by volume of olefins and more than 0.1% by weight of sulfur as thiophenic or other cyclic sulfur compounds, which process will eliminate a substantial portion of the sulfur compounds while maintaining the major proportion of olefins. In this process the gasoline together with hydrogen is introduced into a treating zone maintained at 900 to 1025° F. in contact with an activated alumina catalyst, preferably bauxite. A hydrogen partial pressure of 100 to 400 psi, preferably 125 to 350 psi, is maintained. D. M. Mason

Johnson, C. A. and Schuman, S. C. (assigned to Hydrocarbon Research, Inc.) REMOVAL OF THIOPHENES FROM AROMATIC HYDROCARBONS. U. S. 2,707,699 (1955) May 3.

The process of U. S. 2,707,698 is applied to purification of aromatic hydrocarbons, at temperatures of 900 to 1300° F., preferably 925 to 1200° F., and with hydrogen partial pressure of 100 to 750 psi, preferably 150 to 600 psi.
D. M. Mason

7. ANALYTICAL METHODS AND TESTS

Gas Chromatography

Thomas, B. W. GAS CHROMATOGRAPHY MAY DEVELOP INTO USEFUL PROCESS ANALYZER. *Ind. Eng. Chem.* 47, 85A, 86, 88 (1955) June.

A new kind of chromatography in which the separation takes place in the gas or vapor phase has recently become of interest. Both partition chromatography (desorption with an inert carrier gas) and displacement chromatography (desorption with a strongly adsorbed material) are used. Amounts of separated components are commonly measured by thermal conductivity. D. M. Mason

Petroleum Analysis

Bridgeman, O. C. THE 10 PER CENT POINT SLOPE. *Oil Gas J.*, 54, 93-94 (1955) June 20.

The evaluation of the slope of the percent evaporated versus temperature curve at 10% evaporated has recently become important, since the 10% point slope is being used as a characterization variable in connection with fuel-vaporization phenomena. The distillation curve between 5% and 25% evaporated can be plotted as a straight line or very slightly curved line by using paper with a special X scale of percent evaporated, where X is defined as:

$$X = 2.98 + 0.808\,P - 9.05e^{-0.3P},$$

with P being the percentage evaporated. This empirical equation when used with results of the A.S.T.M. distillation test permits rapid and accurate evaluation of the 10% point slope. Examples of the graphs obtained are included.
B. E. Eakin

Levin, H. PETROLEUM. *Anal. Chem.*, Part II, 27, 599-606 (1955) April.

A review of the analytical literature on petroleum including crude oil, gas, gasoline, kerosene oil, heavier fuels, lubricating oils, and asphalt The year 1953 to 1954 is covered and 193 references are included. D. V. Kniebes

Trace Spectrography

Price, W. J. THE DETERMINATION OF TRACE ELEMENTS IN MAGNESIUM AND ITS ALLOYS BY SPECTROGRAPHIC PROCEDURES. *Spectrochimica Acta*, 7, 118-27 (1955) April.

A survey on the detection and determination of a number of elements at trace concentrations in magnesium and its alloys. Aluminum, beryllium, cadmium, calcium, cerium, copper, iron, lanthanum, lead, manganese, nickel, silicon, silver, tin, titanium, zinc, zirconium, boron, beryllium, barium, and lithium are determined. Concentrations in the range 0.01-0.1 per cent are determined with a coefficient of variation of about 6-8 per cent of the content and increases as the range extends lower.
R. R. Amrine

8. GENERAL AND PHYSICAL CHEMISTRY

Ammonia Recovery

Munekata, E., Imamoto, S., Mihara, K. (assigned to Asahi Chemical Industry Co., Lt.) AMMONIA RECOVERY FROM CUPRAMMONIUM RAYON WASTE LIQUORS. U. S. 2,707,671 (1955) May 3.

Free ammonia in waste solutions from the cuprammonium rayon process is recovered by contacting the solution with over 800 times its volume of free air, recovering the ammonia from the air by contacting with monoammonium phosphate solution, and recovering the ammonia from the resulting diammonium phosphate solution by heating. D. M. Mason

Munekata, E., Inamoto, S., Mihara, K. (assigned to Asahi Chemical Industry Co., Ltd.) METHOD OF RECOVERING AMMONIA FROM DILUTE AQUEOUS SOLUTIONS OF GASES CONTAINING THE SAME. U. S. 2,707,670 (1955) May 3.

Ammonia is removed from dilute aqueous solution or gas by treatment with a cation exchange resin. The adsorbed ammonia is removed from the resin by passing a mixed salt solution of monoammonium phosphate and diammonium phosphate containing the former in a major proportion, to obtain an aqueous solution high in diammonium phosphate. The resin is regenerated by this treatment. The diammonium phosphate is heated to release ammonia, which can be recovered as gas or as concentrated aqueous solution. The process may be modified when the ammonia is present in component form, by pretreatment of the solution with anion exchange resin to remove anions.
D. M. Mason

Equilibrium Calculations

Organick, E. I. FLASH CALCULATIONS AS PERFORMED ON THE IBM CARD PROGRAMMED CALCULATOR. *J. Petroleum Techn.*, 7, 9-13 (1955) May.

This article is a report on the application of a card programmed digital computer to the tedious process of equilibrium calculations. Two programs are outlined: the first for stage separator calculations; and the second for reservoir flash calculations at elevated pressures or process calculations at low temperature, where the equilibrium constants vary significantly with feed stream composition. The second routine will accommodate mixtures containing up to 20 components. B. E. Eakin

Thijssen, H. A. THERMODYNAMIC EVALUATION OF BINARY VAPOR-LIQUID EQUILIBRIA. *Chem. Eng. Sci.*, 4, 75-80 (1955) April.

A graphical method for checking vapor-liquid equilibrium data for binary mixtures utilizing boiling point-composition data is outlined. The activity coefficient variation is obtained by successive application of the Duhem equation to a graph of ln γ_1 and ln γ_2 with $\underline{x}$ composition as parameter. The Harington test for internal consistency of vapor-liquid equilibrium data has been extended to constant pressure, varying temperature and corrected for non-ideal vapor-phase. Application of the technique to the data of the methyl-cyclohexane-toluene system is illustrated. B. E. Eakin

Ethane-Nitrogen

Eakin, B. E., Ellington, R. T. and Gami, D. C. PHYSICAL-CHEMICAL PROPERTIES OF ETHANE-NITROGEN MIXTURES. Institute of Gas Technology Research Bulletin No. 26 (1955) March ($5.00)

This bulletin presents data on liquid-vapor phase equilibria and gas phase pressure-volume-temperature relationships for the ethane-nitrogen system. The liquid-vapor phase equilibrium data were determined by study of the dew and bubble point pressure-temperature relations of ten mixtures of ethane and nitrogen. Dew and bubble points were determined by direct visual observation, and the critical region of the mixtures were carefully noted. The range covered was from 50 to 1950 psia, and —297° to +90° F., the critical temperature of ethane. Pressure-temperature, temperature-composition and pressure-composition diagrams were prepared from the dew and bubble point data. Equilibrium vaporization ratios were determined from these diagrams, and are presented in graphical and tabular form. The gas-phase pressure-volume-temperature data were determined by a study of the pressure-temperature relations

of five mixtures of ethane and nitrogen at constant density. The data, covering the range from the critical region to +110° F. and pressures to 4000 psia, are presented in plots of compressibility factor versus pressure, with lines of constant temperature. The experimental compressibility factors were compared with values calculated with the Benedict-Webb-Rubin equation of state and an empirical combination rule for the A_o term was used to adjust the method of combining constants and improve the agreement with the experimental data.

B. E. Eakin

Gas Diffusion

Wilke, C. R. and Lee, C. Y. ESTIMATION OF DIFFUSION COEFFICIENTS FOR GASES. *Ind. Eng. Chem.*, 47, 1253-57 (1955) June.

Several proposed methods of calculating interdiffusion coefficients of binary gaseous systems are tested with experimental values of 64 systems. The methods of Arnold and Hirschfelder, Bird and Spotz have comparable accuracy, although Arnold's method is easier to use. The average deviation is of the order of 8% when using these methods of calculation.

S. A. Weil

Hydrocarbon P-V-T

Canjar, L. N., Smith, R. R., Volianitis, E., Galluzzo, J. F., and Cabarcos, M. CORRELATION OF CONSTANTS IN THE BENEDICT-WEBB-RUBIN EQUATION OF STATE: *n*-PARAFFINS, 1-BUTENE AND 2,2-DIMETHYLPROPANE. *Ind. Eng. Chem.*, 47, 1028-31 (1955) May.

A method has been developed for estimating the constants in the B.W.R. equation of state for the heavier n-hydrocarbons, for which experimental P-V-T data is not available. The correlation is based on the critical temperature of the component, and is applicable to all n-paraffin hydrocarbons heavier than propane. The constants for 1-butene and for 2,2-dimethylpropane were determined in the course of this investigation, and are included.

B. E. Eakin

9. ORGANIC CHEMISTRY

Aliphatic Chemicals

Sherwood, P. W. PETROCHEMICALS UNLIMITED FROM ETHANE, PROPANE, BUTANES: PART II: DERIVATIVE HYDROCARBONS. *Petroleum Eng.*, 27, C53, 56-60, 62-4, May; C13-16, C18, 19 (1955) June.

After treating conversion of methane and production of aromatics, the author develops the conversion of aliphatics heavier than methane as the third major category of petrochemical operations. In 1953, the Tariff Commission reported 5 billion lbs of C_2-C_4 hydrocarbons used for chemical synthesis, which was only a minor share of the total available. Natural gasoline, LP-gases and petroleum refinery gases are discussed as raw material. Production of ethylene, isobutane, butenes, and butylenes by various American and European processes is reviewed. Part II discusses derivative hydrocarbons as produced by polymerization, alkylation and dehydrogenation. Polyethylene, propylene trimer and tetramer, poly-isobutene, ethyl benzene, cumene, and dodecyl benzene processes are discussed in some detail, and 35 pertinent references are cited.

O. P. Brysch

CS_2 Manufacture

Folkins, H. O., Miller, E. and Hennig, H. (assigned to Food Machinery and Chemical Corp.) PROCESS FOR THE MANUFACTURE OF CARBON DISULFIDE. U. S. 2,709,639 (1955) May 31.

In the manufacture of CS_2 by reaction of sulfur with hydrocarbons, formation of viscous polymeric compounds which degrade into tar and coke is experienced when the hydrocarbon feed contains C_3 and heavier hydrocarbon components in addition to methane and ethane. According to this invention the side reactions which lead to coke and tar formation can be eliminated or substantially reduced, and catalyst efficiency maintained at a high level in the preparation of CS_2 from natural or other hydrocarbon gas containing substantial amounts of heavier and more reactive hydrocarbons, such as propane and butanes and their corresponding olefins, by reactivating the catalyst at definite intervals dependent upon the composition of the charge and conditions of the reaction. Re-

activation of the catalyst may be conducted by contact or purge with oxygen-containing gases, liquid sulfur, sulfur vapor or steam.

D. M. Mason

Hydrogenation

Hoey, G. R. and Le Roy, D. J. THE MERCURY PHOTOSENSITIZED HYDROGENATION OF PROPYLENE AND THE ACTIVATION ENERGY OF THE REACTION $C_3H_7+H_2 + C_3H_8+H^1$. *Can. J. Chem.*, 33, 580-88 (1955) April.

Data are presented on the reaction of propyl radicals with hydrogen in a photo-sensitized system from room temperature to 320° C. At 260° C. and above, the rates of propane formation and pressure decrease are linear with hydrogen pressure. Mechanisms are postulated and activation energies are estimated.

E. B. Shultz

10. CHEMICAL ENGINEERING

Flow Friction

Rothfus, R. R., Monrad, C. C., Sikchi, K. G. and Heidger, W. J. ISOTHERMAL SKIN FRICTION IN FLOW THROUGH ANNULAR SECTIONS. *Ind. Eng. Chem.*, 47, 913-18 (1955) May.

Chelton and Colburn J_F factors were calculated from experimental data obtained, and the experimental results are compared with velocity distribution measurements and with J factors for heat and mass transfer data.

R. F. Bukacek

Fluid Flow

Hahnemann, H. W. and Ehret, L. AN ELECTROLYTIC TANK FOR MEASUREMENTS OF VELOCITY AND POTENTIAL FIELDS. *Eng. Digest*, 16, 147-49 (1955) April.

The equipment described in this article was developed for the determination of flow patterns of two-dimensioned problems, and of three-dimensional problems with rotational symmetry. It is mainly suitable for investigation of incompressible flow, but can be used for compressible fluids by use of the analogies described by Poritsky, Sells, and Danforth.

B. E. Eakin

Oxygen Costs

Van Dyke, B. H. and Dougherty, W. J. COST OF LOW TEMPERATURE PROCESSING. *Chem. Eng. Progress*, 51, 157-61 (1955) April.

Low temperature processing as applied mainly to air separation for oxygen production is discussed from the standpoint of proper process cycle selection and the resultant costs. Two curves, one relating plant cost and the other production cost with plant capacity are included for plants up to 500 tons per day of oxygen. A production cost of $4.50 per ton of oxygen is indicated for a 500-ton per day field-erected, low-pressure cycle oxygen plant.

E. J. Pyrcioch

Pressure Vessels

Samans, W. KEEP THOSE PRESSURE VESSELS SAFE. *Petroleum Processing*, 10, 502-04 (1955) April.

The first in a series of four articles deals with maintenance of unfired pressure vessels. Organization and scheduling is the topic, and inspection systems and methods are discussed at some length.

E. B. Shultz

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Computer Applications

HOW GAS SAMPLE PROBLEM WAS PROGRAMMED ON A DIGITAL COMPUTER. *Gas*, 31, 57-8 (1955) May.

The step-by-step procedure for solving the equation $y = a\,x^2 + b$ for a series of values of x, and tabulating the values of y for special values of x, is given for the Burrough E 101 desk size electronic computer. This is a plug board type programmed machine.

B. E. Eakin

POTENTIALITIES OF COMPUTERS IN SOLVING GAS ENGINEERING PROBLEMS. *Gas*, 31, 45-50 (1955) May.

A panel of industry men present their opinion on a series of seven questions on the application of analog and digital computers to distribution design problems. The potential use of digital computers and some of their particular applications are emphasized.

B. E. Eakin

SYMPOSIUM ON THE USE OF DIGITAL COMPUTERS IN THE GAS INDUSTRY. *Gas*, 31, 44-49 (1955) March.

A discussion of manpower requirements and general organizational procedures for digital computers is presented. D. V. Kniebes

Furnace Atmospheres

Besselman, W. L. INSTRUMENTATION FOR ATMOSPHERE ANALYSIS AND CONTROL. *Ind. Heating*, 22, 704-06, 708, 710, 712 (1955) April.

Specifications for heat treated parts can be met with greater precision when aided by accurate control of composition of furnace atmospheres. Instruments available for making this possible and their use for maintaining safe conditions where gas atmosphere is employed are described in this article. The article comprises a paper presented at the industrial furnace atmosphere session of the Industrial Heating Equipment Association during the National Metal Congress (sponsored by the American Society for Metals) held in Chicago, November 1-5, 1954. Author's Abstract

12. MATERIALS OF CONSTRUCTION

Coatings

Jorczak, J. S., and Dworkin, D. POLYSULFIDE LIQUID POLYMERS. *Materials and Methods*, 41, 110-13 (1955) May.

The use of fine grades of these polymers as sealants, flexible molds and patterns, modifiers for epoxy resins, and leather impregnants is described. The modification of epoxy resins by copolymerization with polysulfides produces resins with greatly improved impact resistance and flexibility and lower water vapor transmission, useful in formulating flexible protective coatings. G. G. Wilson

Palmer, W. D. GIVE YOUR PIPE COATING A CHANCE. *Pipe Line News*, 27, 45-6, 48, 2A (1955) May.

A general discussion of the development and utility of protective coatings for the exterior and interior of pipelines and of the importance of competent coating inspection in the field. G. G. Wilson

Watts, J. C. COATING PIPELINES IN PLACE INTERNALLY WITH PLASTICS. *Corrosion*, 11, 210t-216t (1955) May.

Surface cleaning methods, coating materials, application techniques and drying procedures used to internally coat pipelines in place with plastics are described and discussed. The performance of plastic coatings installed in oil field gathering system pipings beginning in 1948 is outlined and the economies of this coating procedure is illustrated with cost figures based on actual case histories. A list of important factors that should be considered before an internal coating job is attempted as presented. G. G. Wilson

PREVENTION OF PAINT FAILURES—I—SPRAY PAINTING FAULTS. *Ind. Finishing* (British), 8, 268, 270-72, 274 (1955) May.

The undesirable effects of various faulty spray gun techniques are described and illustrated pictorially. Other important considerations in spray painting are also discussed including desirable size paint droplets, desirable shape of spray pattern, and the relationship between spray pressure and fluid nozzle diameter. G. G. Wilson

Corrosion

Swerdloff, W., and Duggan, M. CUT CORROSION IN DEHYDRATION UNIT. *Petroleum Refiner*, 34, 208-12 (1955) May.

Corrosion difficulties encountered in a diethylene glycol gas dehydration unit and the methods used to mitigate them are described. The most successful mitigation methods were: 1) Use of stainless steel (Type 310) for tower linings and trays. 2) Lowering temperature of gas entering contactor. 3) Reducing oxygen content of gas stream. 4) Injection of polyethanal resin-amine type of inhibitor into the glycol. The results of coupon tests before and after various control measures were taken are presented graphically and discussed. G. G. Wilson

Foundation Design

Wilbur, W. E. FOUNDATIONS FOR VERTICAL VESSELS. *Petroleum Refiner*, 34, 127-33 (1955) June.

Loads on foundations of vertical vessels are treated and the principles of design of anchor

bolts, pedestal and base slab are discussed, with tabulated data and an example.

O. P. Brysch

Hydrogen Attack

Van Ness, H. C. and Dodge, B. F. EFFECTS OF HYDROGEN AT HIGH PRESSURES ON THE MECHANICAL PROPERTIES OF METALS. I. APPARATUS, PROCEDURES, AND PRELIMINARY RESULTS. *Chem. Eng. Progress*, 51, 266-71 (1955) June.

Experiments with small specimens fashioned into pressure vessels were conducted both at high-temperatures and at room temperatures. Tension tests were performed to determine hydrogen damage and preliminary results on high-alloy ferrous and nickel-base metals, low alloy steels, and titanium and chromium steels are presented in tabular form at high temperatures (about 475° C. at 1000-2000 atm.) hydrogen attack (reaction with carbon of the metal) was apparent. At room temperatures, 2000-4000 atm and 13 to 18 hours, hydrogen embrittlement (loss of ductility) was found in many metals.

E. B. Shultz

Pipeline Corrosion

Sharpe, L. G. ECONOMIC CONSIDERATIONS IN PIPE LINE CORROSION CONTROL. *Corrosion*, 11, 227t-240t- (1955) May.

The economics of the following major pipe line corrosion problems are examined: 1) Internal corrosion in sour crude oil lines. 2) External corrosion of storage tank bottoms. 3) External corrosion of buried pipelines. For each of these problems the various methods of corrosion control and their relative economics are discussed with all cost figures expressed on a common basis. In each case conclusions are drawn on the basis of the cost figures presented. Comments on the information presented in the article by leading engineers in the corrosion field are also included.

G. G. Wilson

Plastic Pipe

Corfield, G. REPORT ON PLASTIC PIPE STANDARDS. *Amer. Gas Assoc. Monthly*, 37, 38, 54 (1955) May.

A summary of the recommendations on types of plastic material recommended for gas industry use given to the AGA. Subcommittee on Plastic Pipe Standards by a special committee of the Society of the Plastics Industry. Specific formulations of poly-vinyl chloride, styrene-acrylonitrile, and butyrate are the only thermoplastic materials recommended. Recommendations on allowable working stress and wall thickness for each of these materials are tabulated.

G. G. Wilson

Stress Corrosion

Fontana, M. G. CORROSION—TENTH OF A SERIES OF COLUMNS ON CORROSION TESTING DESCRIBES PROCEDURES FOR STRESS-CORROSION TESTS. *Ind. Eng. Chem.*, 47, 91A-92A (1955) June.

Five different types of equipment used to apply stresses to metal specimens to be used in stress-corrosion tests are described and briefly discussed.

G. G. Wilson

Tubing Failure

Texter, H. G. WHY OIL-WELL TUBING AND CASING FAIL IN TENSION, AND WHY THEY COLLAPSE. PART I. *Oil Gas J.*, 54, 86-92, 95-96 (1955) July 4.

This article considers the conditions which make up tension loading, design factors in tension, mechanism of failure, and the theory of tension failures. Various types of tension and compression failure and their causes are also covered, with illustrations of each type. The succeeding two articles in this series will deal with: bursting, failure at last engaged thread, leakage, and crushing; and wear, erosion, buckling, torsion, corrosion, and miscellaneous failures.

B. E. Eakin

Welding Tests

Cunningham, L. J. and Williams, S. V. NORTHERN NATURAL'S WELDING TESTS SHOW 30° PIPE BEVEL BEST FOR PIPELINES. *Oil Gas J.*, 54, 70-3 (1955) May 30.

A discussion of tests conducted by Northern Natural Gas Co. and the University of Omaha to determine the relative performance and costs of welding line pipe using 37½° bevels and 30° bevels. Comparable welds were found with reduced welding time and electrode weight.

R. F. Bukacek

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Institute of Fuel (British). Journal
Institute of Gas Technology Publications
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Institution of Gas Engineers. Bulletins, Communications and Transactions
Instruments

Jet Propulsion
Journal des Usines a Gaz
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Journal of Applied Mechanics
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Mathematical Aids
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National Advisory Committee for Aeronautics, Reports
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National Gas Bulletin of Australia
National Petroleum News

Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Oil, Paint and Drug Reporter
Optical Society of America. Journal

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Petroleum Refiner
Physics Today
Pipe Line Industry
Power
Producers Monthly
Public Utilities Fortnightly

Refrigerating Engineering
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Review of Scientific Instruments
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Science
Southern Gas Association Progress
Spectrochemica Acta
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